

On-Site Reuse of Concrete From Demolition Projects for New Construction Projects– Rich Jones, John Gottlieb, Richard Scheidet, and Peter D. Pohlot

During 2006, Brookhaven National Laboratory (BNL) demolished 10 buildings/structures while constructing 2 new facilities (the Research Support Building and the Center for Functional Nanomaterials). This paper details how the concrete from the demolition projects was re-used as part of the new construction projects at a significant cost savings to the Laboratory.

BNL has an authorization from the New York Department of Environmental Conservation to operate what's known as the "Borrow Pit". The Borrow Pit is an area where sand was mined for a Laboratory project, leaving a large void space in the firebreak area south of the Laboratory. The authorization allows BNL to fill the void space with Construction & Demolition (C&D) debris. Approximately 4-years ago when the Borrow Pit was close to capacity, a decision was made to bring in a concrete crusher and mine the Pit to generate Recycled Concrete Aggregate (RCA) to be used around the Laboratory's firebreak road system to stabilize the roadways and as new road base for new parking areas and roads. Prior to this, the Laboratory purchased virgin crushed blue stone to stabilize the firebreaks.

During 2006, numerous older structures (pre-1950) were demolished due to issues such as advanced stages of deterioration, energy inefficiency, and repairs not being cost effective. The following table details the buildings that were demolished and the respective amounts of material (in tons) that were recycled (concrete and metals) and the remains that were sent off-site to a C&D management facility (i.e., roofing shingles, lumber, siding, etc...)

Building	Concrete	Metals	C&D
86	300	3	260
326	5	0	18
400 parking lot	2000	0	0
422	80	0	160
445	2600	2	12
527	0	0	150
707/707A	220	20	0
707B	32	0	0
715	6	0	6
753	12	0	12
750 CT & Tank Storage	250	10	0
Totals (tons)	5505	35	618

These demolition projects generated over 5500 tons concrete, which was crushed at the Borrow Pit and recycled as RCA (see Figures 1 and 2). The majority of this RCA (approximately 4800 tons) was used as the predominant base for the parking lots of the two new construction projects – the Research Support Building and the Center for

Functional Nanomaterials (see Figures 3 and 4). The remainder was used for stabilization of the firebreak roads and various other small on-site projects.

The following table details the economics of BNL's segregation, crushing and recycling/reuse of building demolition wastes based on year 2006-generation rates.

Waste Stream	Weight (tons)	Disposition	Cost	Total Cost
C&D	618	C&D Landfill	(\$100/ton)	(\$61,800)
Concrete/Masonry	5,505	Borrow Pit	\$0/ton	\$0
Metals	35	Metals Recycler	\$33/ton	\$1155
Total	6,158			(\$60,645)

The following table details the cost savings generated by the on-site concrete reuse verse the conventional method of disposal at a C&D transfer yard.

Disposal Costs	Conventional Method (C&D Landfill)	BNL Method (Crush & Reuse)
C&D Landfill (\$100/ton)	\$550,500	\$0
Blue Stone for base (\$36/ton)	\$198,180	\$0
2-Week Crusher Rental	\$0	\$32,000
Total Cost	\$748,680	\$32,000

$$\text{Total Cost avoidance} = \$748,680 - \$32,000 = \$716,680$$



Figure 1 - Concrete to be crushed



Figure 2 – Concrete getting crushed



Figure 3 – Research Support Building



Figure 4 - Center for Functional Nanomaterials